



## Why do we use lug cores instead of mitering?

Our goal is strong, resilient and robust bikes. This is made easier by a repeatable fabrication process. Once we chose to utilize hand woven composite lugs, we moved on to creating a nice shape to wrap over... Essentially, we needed a nice mold over which we could create a composite lug.

The key for us was to develop a way to get a smooth shape that transitioned from one tube to another, without any stress concentrators or sharp edges. Our original lug cores were made through an additive process, where we mitered the bamboo and added a mixture of sawdust and foam to produce transition shapes. There were a number of problems with this:

- Mitering bamboo was problematic. Mitering, for us, was an extremely time consuming and unreliable process that put a lot of stresses on the bamboo tubes. We scrapped as much as 30 percent of our bamboo using the most efficient process we could develop. Additionally, it required a special adjustable jig that we designed and built. Mitering could be done by hand, but took much too long for either a Do-It-Yourself experience or for a mass production setting.
- The additive process was also very time consuming. It involved mixing sawdust and epoxy to create a slurry that was slopped on the joints to create a fillet between the tube joints. It was a difficult process resulting in a less than ideal shape, which meant a lot of filing the hardened epoxy and saw dust mixture.

We later settled on a reductive process using polyurethane foam for the center of the lugs and butting the bamboo to this lug core. This process is similar to shaping a surfboard. The ability to create a smooth shape is much enhanced by removal rather than addition. The balsa and foam core is a lot more fun to sand down than the hardened epoxy. By cutting the bamboo square, it greatly reduces the amount of wasted/unusable bamboo and makes it more feasible for people to accomplish the task. Additionally, it makes the tacking process faster.

So far, we've put out over 350 bikes with this process and have seen no returns.